Fill Removal and Wetlands Restoration Plan

for the matter of
Civil Action No. 2:17-cv-01244-DAK
Saratoga Springs Harbor, Utah County, Utah

Prepared by:

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EXECUTIVE SUMMARY

Cross Marine Projects, Inc. ("Cross Marine") and the Saratoga Springs Owners Association ("SSOA") propose to conduct a fill removal and wetlands restoration plan in designated areas adjacent to the Saratoga Springs Harbor, located on the northwest side of Utah Lake in Utah County, Utah. The general locations of the fill removal and wetlands restoration work areas are shown on Figure 1. The proposed plan is based on a fill removal and wetlands restoration plan that has been prepared by Frontier Corporation USA ("Frontier"), environmental consultants assisting with the restoration work, and Cross Marine, who will be the restoration contractor. All components of the fill removal and wetlands restoration plan have been closely coordinated with the SSOA. Additionally, the plan has been reviewed and approved for implementation by the Utah Division of Forestry, Fire & State Lands ("FFSL"), which has State jurisdiction over Utah Lake and the Saratoga Springs Harbor area.

The proposed plan entails two parts, referred to herein as Part A and Part B. An aerial map of the fill removal and wetlands restoration plan is provided in **Appendix A**.

Part A will involve the removal of fill material from approximately 0.37 acres adjacent to the south dike of the harbor to restore a wetland plant community. Part A will also include removal of the rock retaining wall from a hot spring that outlets on the west side of the harbor boat ramp to establish free flow directly into the harbor.

Part B will involve both herbicide and physical treatments to reduce and control the presence of Phragmites in two areas bordering the south and north sides of the harbor. The south side Phragmites control area is approximately 6.0 acres in size (Appendix A). The north side Phragmites control area is approximately 2.5 acres in size (Appendix A). The goal is to treat a total of 7.0 acres of Phragmites between the south and north areas, the boundaries of which will largely be dependent on lake levels at the time of the treatments. The Phragmites treatments will be done consistent with current FFSL protocols and standard procedures for the treatment of Phragmites on Utah Lake.

Implementation of the fill removal and wetlands restoration plan will require approvals by

several participants, including: the U.S. Environmental Protection Agency ("EPA") and the U.S. Army Corps of Engineers ("USACE") who have federal Clean Water Act jurisdiction; the FFSL, which has jurisdiction of State land ownership of Utah Lake and adjacent shores; and the SSOA, which has lease rights for the harbor area. The fill removal and wetlands restoration identified in this plan cannot be implemented until all necessary federal, state, and local approvals have been obtained.

1.0 FILL REMOVAL AND WETLANDS RESTORATION (PART A)

1.1 OBJECTIVES

- Conduct wetland restoration by removing fill material adjacent to the southwest side of Saratoga Springs Harbor on Utah Lake.
- Remove fill material from approximately 0.37 acres in the area indicated (Appendix A) and establish surface topography similar to the existing wetlands that are adjacent to the fill removal area.
- Re-establish native wetland plants that help control the presence of invasive Phragmites.
- Remove the rock retaining wall from a hot spring that outlets on the west side of the harbor boat ramp to establish free flow directly into the harbor
- Conduct restoration operations in a safe manner and minimize negative impact on the aquatic environment and adjacent residential structures and public amenities.
- Complete the required work in compliance with state and federal rules and regulations.
- Beautify environmental conditions in a manner that provides the public with both a safe and pleasant experience in visiting and utilizing the site by restoring proper functioning wetland habitats that are native to Utah Lake.

Example of a native marsh wetland plant community on the Utah Lake shoreline near the fill removal and wetlands restoration work areas.

Figure 1. General Site Location Map
1:24,000 Scale Topographic Base.

1.2 EXISTING SITE CONDITIONS IN FILL REMOVAL AREAS

Frontier completed site inspections in May and June 2018 to characterize and document existing site conditions. The documentation included:

- The delineation, flagging and GPS survey of existing wetland boundaries abutting the fill removal area.
- The wetland boundary survey was done with a Trimble Geo7x GPS. The wetland boundary survey was overlaid with the fill removal plan, and the fill removal area was adjusted to match the existing wetland boundary (Appendix A).
- Completion of three paired sample points to document the existing wetland/upland boundary along the fill removal area. The sample points and neighboring areas were photo documented and the delineation data were recorded on USACE 2008 Arid West Wetland Determination Data Forms. Sample point and photo point locations are shown of Figure 2a. Copies of the sample point data forms are provided in Appendix B. Photo logs depicting existing site conditions are also provided in Appendix B.
- Cross Marine used a backhoe to dig six test pits in the fill removal area. Frontier photo-documented and recorded the soil profile, depth to saturation and depth to water table at each test pit. Frontier also documented the plant community at each test pit. Test pit results are provided on customized data forms provided in Appendix B.
- Frontier used an Engineers Level to estimate the approximate difference between the surface elevation of the fill removal area and the surface elevation of the adjacent existing wetlands. One level station (L1) was set-up on top of the fill removal area and one level station (L2) was set-up on top of the existing harbor dike. The locations of the level stations and surveyed reference points that were used to estimate differences in surface elevations are shown on Figure 2b. The approximate elevational differences relative to the level stations are also shown on Figure 2b. Elevation tables for the two level stations are provided in Appendix B.

Figure 2a. Existing Conditions Map

Saratoga Springs Harbor Area
Utah County, Utah

Map Date: June 14, 2018
Map Preparer: K. Schmid
Aerial Imagery Date: June 17, 2017
Aerial Image Source: Google Earth

0 25 50 100 Feet

1 inch = 50 feet

UTM Zone 12 50 Meter Grid

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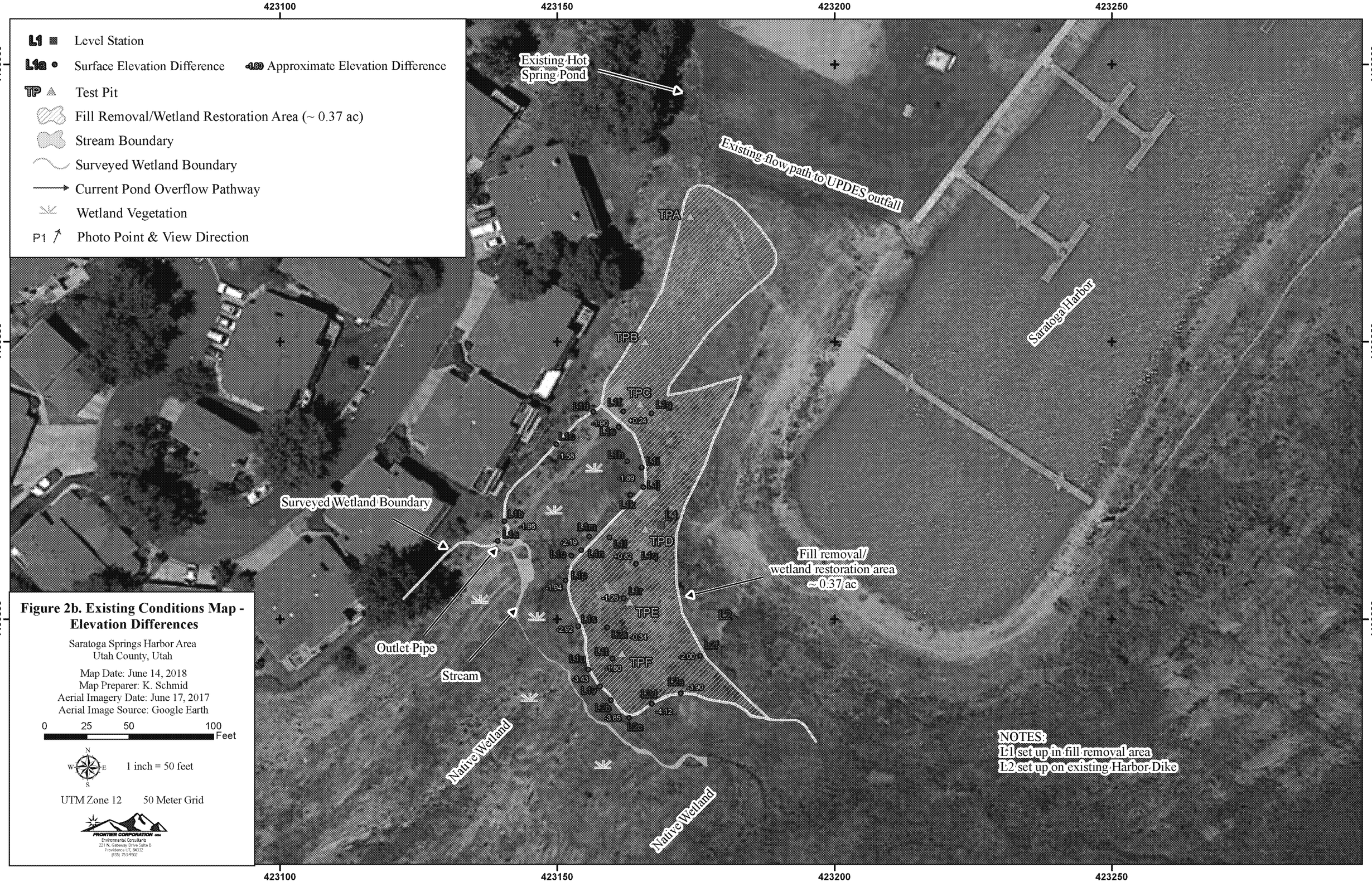

Figure 2b. Existing Conditions Map - Elevation Differences

Saratoga Springs Harbor Area
Utah County, Utah

Map Date: June 14, 2018
Map Preparer: K. Schmid
Aerial Imagery Date: June 17, 2017
Aerial Image Source: Google Earth

0 25 50 100 Feet

1 inch = 50 feet

UTM Zone 12 50 Meter Grid

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Existing Wetland Conditions

The existing wetlands adjacent to the west sides of the fill removal area are dominated by invasive, non-native common reed (aka Phragmites) (*Phragmites australis*). In fact, Phragmites is spreading rhizomatously from the wetlands on to adjacent fill slopes where upland sample points were conducted. (See delineation sample points SP1A, SP1B, SP3A and SP3B in Appendix B and as shown on Figure 2a.)

Phragmites was also the dominant plant identified in this area by Horrocks Engineers in October 2010 (Horrocks Engineers 2010) for the annual monitoring report covering fill removal and wetlands restoration that was completed in 2008 by the SSOA for the same area. In fact, Horrocks Engineers reported in 2010 that only 70% of the 2008 fill removal area had wetland plants, of which 80% was Phragmites. The other 30% of the 2008 fill removal area had 75% aerial coverage of non-wetland plants.

Similarly, Bowen and Collins (2012) also identified Phragmites as the predominant wetland plant in this area in a wetland delineation that was completed for the SSOA dated January 2012. The 2012 delineation report predates maintenance work that was done by the SSOA and Cross Marine in the Harbor Area. In the 2012 delineation report, a wetland delineation sample point conducted within the current fill removal work area identifies 85% invasive Phragmites, 5% of an unknown knapweed species (*Centaurea* sp.), and 5% Russian olive (*Elaeagnus angustifolia*). All knapweed species in the Arid West have a UPL or FACU indicator status. Russian olive is an invasive non-native tree that has a FAC indicator status.

Thus, the existing wetland plant community adjacent to the west side of fill removal area is identical to those previously described by Horrocks Engineers in 2010 and Bowen and Collins in 2012. Notably, the wetlands described in these reports barely meet the wetland vegetation criteria but for the presence of Phragmites.

However, the existing wetland plant community on the south side of the fill removal area is different. (See delineation sample points SP2A and SP2B in Appendix B and as shown on Figure 2a). The wetland plant community in this area is dominated by a variety of native

wetland species, including: common spikerush (*Eleocharis palustris*), three-square (*Schoenoplectus pungens*), alkali clubrush (*Schoenoplectus maritimus*), Baltic rush (*Juncus balticus*), Torrey's rush (*Juncus Torreyi*), cattail (*Typha latifolia*), and hardstem clubrush (*Schoenoplectus acutus*). This area of wetland has flowing water present in the form of a stream that is fed by an outlet pipe that drains into the wetlands near the base of the existing residential units (Figure 2a). It is assumed that this is a land drain pipe that captures underground spring water that is common to the harbor area. Phragmites had a 15% presence at wetland sample point 2A and a 100% presence in upland sample point 2B. The presence of flowing water in this area of existing wetlands appears to keep the presence of Phragmites in check.

Test Pit Results

The test pits B, C, D, E and F are all similar in that they show the presence of gravel/sand/silt/loam in the upper layers ranging from 2.0 to 3.1feet in depth on top of a saturated clay layer with a water table ranging from 3.0 to 4.0 feet below surface when measured on June 1, 2018. (See test pit data forms in Appendix B and as shown on Figure 2a.). The gravel/sand/silt/loam appears to be imported material.

Test Pit A is different in that the upper gravel/sand/silt/loam layer went to a depth of 4.2 feet below surface. Concrete and woody debris was buried between 4.2 and 5.0 feet. Saturated clay began at 5.0 feet and the water table was at 6.2 feet below surface. Test Pit A appears to be within the area that Horrocks Engineers identified in its 2010 monitoring report as having 75% non-wetlands plant present.

Elevational Differences

As shown on Figure 2b, the elevation differences between the existing wetland boundary and the top of the fill removal area relative to Level Station 1 (LS1) is about 2 to 3 feet. This elevational difference is approximately the same depth to the saturated clay layer recorded for Test Pits B, C, D, E and F.

1.3 FILL REMOVAL AND WETLAND RESTORATION PROCEDURES

A. Remove fill from 0.37 acres of land located in the designated removal area until the bottom elevation of the fill removal area is substantially the same as surface elevations of adjacent native wetland areas. A laser level will be set up in the existing wetlands to compare the bottom finish elevation

B. Record slope angles for fill removal areas adjacent to the existing residential homes. Slope angles will be 4:1 next to the homes and 3:1 next to the harbor dike.

C. A standard haul carrier will be used to remove the material to a designated upland site(s) in the harbor area approved by the EPA and FFSL, or hauled off-site for upland disposal.

D. Lake water and the natural water table underlying the fill removal area as documented in the test pits will be the main sources of hydrology to maintain the restored wetland.

E. A combination of re-seeding with native wetland plants and colonization from adjacent wetland areas will be the method for revegetation. Reseeding may help to control the re-establishment of invasive Phragmites, which is the predominant plant in this area.

F. The wetland seed mix will be based on the availability of native sources available through Granite Seed, a local seed company located in Lehi, Utah. A 2018 list of wetland seed carried by Granite Seed, seed costs, and recommended application rates area is shown in Table 1. A seed mix will be submitted to the EPA for approval prior to purchase and application.

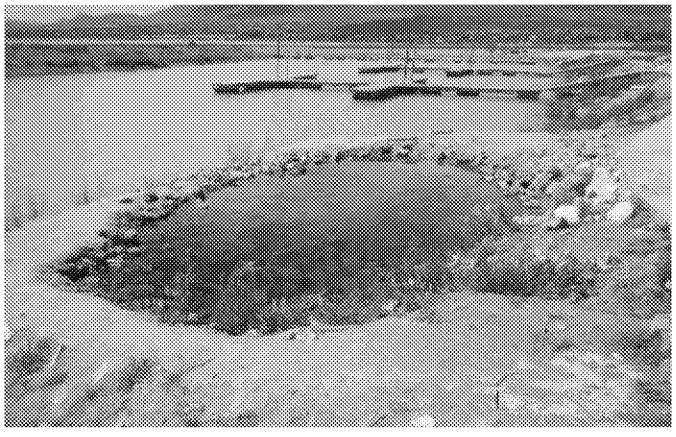
G. Seed mix will be employed by broad casting and hand raking.

Table 1. Wetland seed available through Granite Seed Company, Lehi, Utah (2018).

Species	$/PLS lbs.	Seeding Rate: PLS lbs. /acre
Baltic rush (*Juncus balticus*)	120.00	0.10
Nebraska sedge (*Carex nebrascensis*)	95.00	3.00
Torrey's rush (*Juncus torreyi*)	150.00	0.25
Beaked sedge (*Carex rostrata*)	150.00	4.00
Hardstem clubrush (*Schoenoplectus acutus*)	75.00	5.00
Olney's clubrush (*Schoenoplectus americanus*)	110.00	10.00
Alkali clubrush (*Schoenoplectus maritimus*)	35.00	11.00
Saltgrass (*Distichlis spicata*)	42.00	5.00
Alkaligrass (*Puccinellia distans*)	9.00	2.00

1.4 ROCK WALL REMOVAL PROCEDURES TO RE-ESTABLISH FREE FLOWS INTO HARBOR

Overflows (pink arrow in Appendix A) from natural hot springs are currently captured by a rock retainer (#4 in Appendix A) wall located on the south side of the harbor boat ramp.



Existing rock retainer wall that will be removed to establish free flow into harbor.

A. The existing rock retainer wall will be removed from the hot spring outlet to establish free flow into the harbor.
B. The free flow of hot spring water into the harbor will help maintain ice-free water in the harbor during the winter months.

1.5 ON-SITE EQUIPMENT, PERSONNEL, AND RESOURCES

The plan may include, *inter alia*, the following:

A. Survey equipment.
B. Fully-equipped hazard control vehicle.
C. Light ground pressure excavation backhoes, track hoes or similar excavation equipment.
D. Light ground pressure haul trucks and/or dump trucks to remove excavated fill material to designated upland disposal sites.
E. On-site safety officer.
F. Special signs, banners, and night barricades to insure the safety of any vehicles or visitors using areas in the close proximity.

G. Communications systems among all on-site workers.
H. Daily reports and photographic documentation of work performed.
I. Daily safety meetings with all participants.
J. Specialized heavy equipment support matting, i.e., pierced armor planking interlocking mesh
K. Any other equipment for the above referenced plan.

1.6 SAFETY AND ENVIRONMENTAL PROTECTION

A. Safety and first-aid equipment.
B. Fully equipped medical and environmental emergency vehicle to be placed onsite.
C. Cross Marine Projects will perform the fill removal in accordance with industry standards regarding worker safety, environmental protection, and completion of this mitigation plan in a timely and cost-effective manner.

1.7 STATE AND LOCAL AGENCY APPROVALS REQUIRED

A. Approval for the fill removal signed by Department of Forestry and State Lands and the SSOA.

1.8 IMPLEMENTATION SCHEDULE

A. Assuming all approvals and agreements for the implementation of the fill removal and wetlands restoration plan are obtained by October 11, 2018, it is anticipated that mobilization work on Part A would begin in October, 2018 and be completed between November 1 and December 31, 2018. This time frame is necessary to insure the reservation of the special required equipment from other projects.
B. It is assumed that a Utah Division of Water Quality UPDES construction general permit will not be required because the fill removal and restoration work will not cause more than 1 acre of excavated soil disturbance.

1.9 SUCCESS CRITERIA

A. The EPA and USACE will be requested to conduct an on-site inspection within 30 days of receiving an as-built report and aerial drone videography and/or still photography (described

in Section 1.10) to confirm the completion of the Part A fill removal and wetlands restoration work, and the removal of rock walls to allow the natural hot spring on the south side of the harbor boat ramp to flow freely into the harbor.

B. Upon completion of the on-site site inspection, the EPA and USACE will be requested to provide email correspondence that confirms the work to physically remove the fill and rock material from the wetlands restoration area and natural hot spring outlet have been completed.

C. Aerial drone videography and/or still photographs shall be submitted to the EPA and USACE with the as-built report. The aerial drone videography and/or still photographs will provide photographic evidence that the fill removal work has been completed as proposed in Part A.

D. The plant community on the bottom elevations of the fill removal area (excluding side slopes) has been demonstrated to have vegetation, soil and hydrology conditions that meet the USACE Arid West wetlands delineation criteria (USACE 2008) for two (2) consecutive growing seasons following the removal of the fill material.

1.10 MONITORING AND REPORTING PROCEDURES

A. Aerial drone videography and/or still photography will be taken to document as-built conditions in both the Part A fill removal and wetlands restoration area and the Part B Phragmites control treatment areas.

B. An as-built report will be submitted to the EPA within 60 days completion of the aerial drone videography and/or still photography for both the Part A and Part B work areas.

C. For the Part A work, the as-built report will also include a boundary survey of the restoration area with a submeter accurate GPS. The as-built survey will differentiate slope angles from the finished bottom elevations. The as-built survey will include photographs at locations that will be used for repeat photo point locations during post-restoration monitoring.

D. Restoration monitoring will be completed for five (5) growing seasons following the removal of the fill material and replanting of the 0.37 acre wetland restoration area, or until it has been documented that wetland conditions have been established within the fill removal area for two consecutive growing seasons, whichever is shorter. Restoration monitoring will be completed in May for soils and hydrology and in mid- to late-July when plants have matured for species identification.

E. Assuming the restoration work is completed in the autumn of 2018, restoration monitoring will begin in May 2019.

F. A qualified wetland scientist with past experience and familiarity with Utah Lake wetlands will complete annual monitoring inspections to document the progress of wetland revegetation in the fill removal area.

G. Annual site inspections will include the recordation of eight (8) wetland delineation sample points within the fill removal area to verify the presence of wetland conditions. Sample points will be recorded on USACE Arid West Wetland Determination Data Forms.

H. Annual site inspections will also include repeat photos at the designated locations identified on the as-built survey.

I. An annual monitoring report will be submitted to the EPA and USACE by September 10 of each monitoring year. The EPA and USACE will be requested to provide written comments on the progression of the wetlands restoration within 45 days receipt of the annual monitoring report.

1.11 EPA INSPECTION PROCEDURES

A. As per paragraph 26 of the Consent Decree, the EPA and/or USACE may conduct site visits to inspect the progress of the fill removal and wetlands restoration work. In most circumstances, the EPA and USACE will attempt to provide no less than 1 week prior notice to Cross Marine and the SSOA.

B. When EPA and/or USACE provide notice of an impending site visit, Cross Marine and the SSOA will be given the opportunity to attend the subject site inspections.

2.0 PHRAGMITIES CONTROL (PART B)

2.1 OBJECTIVES

- Treat approximately 7 acres of existing Phragmites stands between the south and north treatment areas (yellow lines in Appendix A).
- Work in accord and agreement with the FFSL, which manages the shoreline and bed of Utah Lake, wherein this Phragmites control plan will be implemented.

- Perform the agreed-upon Phragmites control in a manner consistent with current FFSL standards for Utah Lake in consideration of: (1) effectiveness of Phragmites removal, (2) worker and public safety, and (3) cost efficiency.
- Beautify the harbor in a manner with specialized systems and methods that will gain and maintain public support for future Phragmites treatments around the Utah Lake shorelands.
- Provide the FFSL and others with any and all required documentation, as Cross Marine has done on multiple Phragmites-control contracts in the past, covering major areas of the Utah Lake Shoreline.

Typical example of an invasive monoculture of non-native Phragmites displacing native wetland plant communities along the Utah Lake shores.

2.2 EXISTING SITE CONDITIONS IN PHRAGMITES CONTROL AREAS

A. Phragmites is an invasive, non-native reed species that has been spreading across the Utah Lake shoreline since at least the late 1980s. The noxious reed can grow up to 14 feet tall. Phragmites is harmful because it forms dense monoculture stands that choke out and replace native wetland plant communities. Additionally, decadent Phragmites stands are a fire hazard and foster mosquito breeding.[1]

B. Cross Marine has been instrumental in demonstrating viable methods for removing and controlling Phragmites that are currently being used around the State of Utah.[2]

C. Letters of commendation are available to demonstrate to the overseeing agencies Cross Marine's knowledge, experience, and capabilities for Phragmites control.

[1] http://utahlakecommission.org/phragmites-removal-2014/
[2] http://utahlakecommission.org/wp-content/uploads/2017/02/Utah_Lake_Master_Plan_small1.pdf

2.3 PHRAGMITES CONTROL PROCEDURES

A. Two areas totaling approximately 8.5 acres have been identified for Phragmites control (Appendix A). A total of approximately 7 acres of decadent Phragmites stands will be treated with aerial herbicide applications and mechanical destruction.

B. The treatment described herein is consistent with current procedures and methods approved by the FFSL for Utah Lake and recommended in *How to Restore Phragmites-Invaded Wetlands* (Rohal et al., 2017).

C. Phragmites will be treated with AquaNeat® herbicide applied by aerial treatment, land equipment, and/or hand application. A helicopter will be used for the application of AquaNeat® herbicide to kill existing Phragmites on the lake shoreline. AquaNeat® is an EPA-approved herbicide for application in aquatic environments. Aerial helicopter herbicide treatments will be performed following Utah State Agency guidelines and standards, which include a 50-foot buffer area between the treated areas and adjacent residential, commercial, or public park areas.[3] The buffer areas will be treated, as needed, using ground methods. This is considered to be an adequate distance to eliminate potential damage to landscaped yards and other desirable plants on the shoreline.[4]

D. Site markers will be placed around the perimeters of the two shoreline Phragmites treatment areas for visual airborne identification prior to scheduling the helicopter flight.

E. Marsh Master amphibious equipment may also be used to spray Phragmites on the lake shoreline. Phragmites on the harbor dikes will be sprayed using land-based ATV-mounted or backpack sprayers.

F. Dead Phragmites will be mechanically trampled and destroyed using Marsh Masters equipment (or equivalent equipment) in the two shoreline treatment areas.

G. The timing of the herbicide treatments will be scheduled taking into consideration past, present, and foreseeable weather patterns and lake levels that could impact the effectiveness of the herbicide treatments. Late-August and early-September is the FSSL's recommended timeframe for herbicide treatments. During this period, Phragmites are in a period of growth which makes the intake of the herbicide most effective while still allowing a proper amount

[3] Id.
[4] Id.

of time for the reeds to become brittle so they can be trampled before the onset of cold winter months. This timeframe is also recommended based on migratory bird avoidance guidelines that are approved by the FFSL, the Utah Department of Agriculture, and the Utah Division of Wildlife Resources. A delay of a year may result if the time of treatment is delayed past early-September.

Photo of Cross Marine using a Marsh Master tracked amphibious machine to trample and destroy dead Phragmites.

H. Because of the way the equipment is designed and used, minimal damage to the aquatic environment is expected. However, it must be understood by all parties that this process does disturb underlying substrates by mechanically trampling the dead stalks into the substrates. The trampled stalks are effectively tilled into the substrates, which hastens the decomposition of the organic material and the recolonization of native wetland plants.

Cross Marine at work destroying Phragmites on the south side of Saratoga Springs Harbor in the autumn of 2013.

I. Consistent with the FFSL's current Phragmites control program on Utah Lake, the late-summer herbicide spraying and late-autumn/winter mechanical trampling procedure will be completed over three (3) consecutive years as a means to ensure best effectiveness for

removal of Phragmites and reestablishment of native wetland plants. This assumes that the Phragmites will be sprayed and trampled in 2018, 2019 and 2020.

J. Upon completion of the Phragmites treatment work, aerial surveys and ground level surveys will be performed to document that the work has encompassed the agreed-upon acreage on a best-effort basis.

K. Based on past projects, the actual breakdown and in situ decomposition of mechanically trampled Phragmites stalks may take up to three years depending on weather, lake level inundation, ice scouring and other environmental factors, the completion of which is not the responsibility of Cross Marine.

L. Consistent with the FFSL's Phragmites control protocols, the revegetation of treated areas will be reliant on the natural recolonization of native wetland plant species. Following the completion of the third herbicide and trampling treatment, in July of 2021, the Phragmites treatment areas will be monitored to document the reestablishment of vegetation as per the methods specified in Section 2.9 of this Plan.

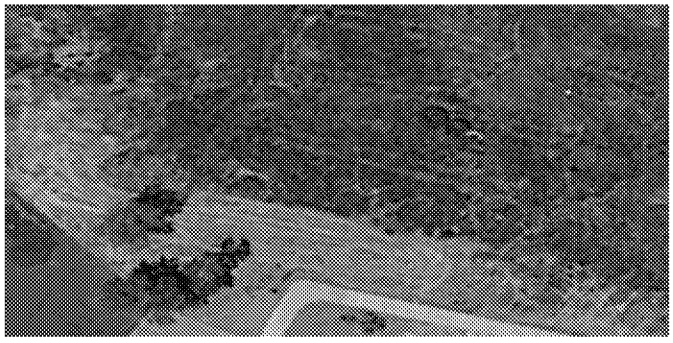
M. If monitoring concludes that Phragmites comprises more than 30% of new plant growth in the treated areas in July 2021, the treated areas will be reseeded with a wetlands plant mix. This will be a onetime only reseeding effort.

N. If monitoring Phragmites comprises less than 30% of new plant growth in the treated areas in July 2021, no reseeding will be necessary.

O. It must be recognized by all involved parties that the two Phragmites treatment areas are surrounded by hundreds of acres of Phragmites infested shorelands and that it is impracticable to expect total eradication of this invasive species from the two Phragmites control treatment areas.

P. A survey to delineate the extent of the existing harbor dikes fill limits shall be performed within one year following entry of the final Consent Decree and approval by the Court. Ideally, the dike survey will be completed after the first Phragmites treatment has been completed and when the lake level is low. The fill limits of the harbor dikes will be delineated in the field and surveyed with a sub-meter accurate GPS consistent with survey precision as required by the Corps of Engineers for wetland delineations. An aerial map showing the surveyed extent of the harbor dikes shall be submitted to the EPA and the USACE for review and approval.

Q. Tires within the inland Phragmites treatment boundaries will be piled near the harbor dock for future removal by the SSOA.



Known inland location of tires at Saratoga Springs Harbor near the north Phragmites control area.

2.4 ONSITE EQUIPMENT, PERSONNEL, AND RESOURCES

The plan may include, *inter alia*, the following:

A. Two four-wheel drive pick-up trucks to be used as fuel containers and towing vehicles.

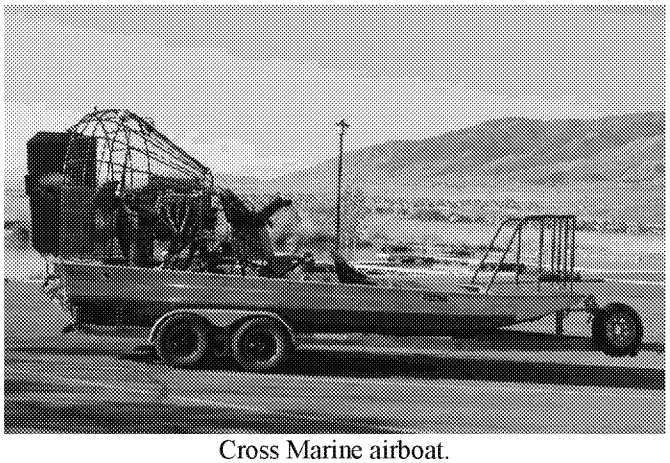
B. One enclosed trailer for transporting supplies and maintenance.

C. One or more custom-built Marsh Master amphibious units or equivalent.

Example of Marsh Master amphibious tracked vehicle that will be used by Cross Marine to trample and destroy dead Phragmites following herbicide treatments.

D. Custom-built crusher roller to be towed behind tracked Marsh Master amphibious machines. This would only be done in dry areas where soils are firm and hard.

E. One, custom-built, industrial environmental air boat with support equipment to be used in support of the Marsh Master equipment



Cross Marine airboat.

F. One 42-foot sea ark vessel to support operations, handle fueling and access to the various work sites and to tow the Marsh Master units from work spot to work spot.

Sea ark vessel

G. In conjunction with the tracked amphibious Marsh Master equipment, Cross Marine may use one (1) special shallow-draft airboat and two (2) specially constructed shallow draft work vessels to help with fuel issues, transporting workers and supplies, and towing the tracked vehicle to and from each location of work. This will insure that these areas are cleared quickly, safely, and, therefore, economically.
H. Four-man crew to oversee all operations.
I. Safety and first-aid equipment.
J. Complete photographic documentation from before and after project.
K. Fully equipped medical and environmental emergency vehicle to be placed onsite.
L. Daily reports recording all activities performed.

M. Other equipment as required. Since Cross Marine's Western States Regional Office and warehouse are located in American Fork, Utah, it can provide any needed services quickly on short notice.

2.5 SAFETY AND ENVIRONMENTAL PROTECTION

A. Cross Marine Projects will perform the Phragmites treatments in accordance with industry standards regarding worker safety, environmental protection, and completion of this mitigation plan in a timely and cost-effective manner.

B. In over 40 years of operations, Cross Marine has only suffered only one injury on a jobsite: a broken toe. Cross Marine carries one of the best safety records for a company regularly performing work during natural disasters around the world.

C. Cross Marine will also have a fully equipped environmental emergency vehicle onsite with any items needed for this project. Cross Marine employs workers who are qualified paramedics and emergency field personnel should an unexpected incident occur.

2.6 STATE AND LOCAL AGENCY APPROVALS REQUIRED

A. Written approval will be obtained from the FFSL prior to scheduling the aerial herbicide treatments and trampling of dead stalks with Marsh Masters.

2.7 IMPLEMENTATION SCHEDULE

The first round of aerial herbicide treatments for the two Phragmites control areas was completed the week of August 27, 2018. The first round of trampling with Marsh Masters will be completed by December 31, 2018 assuming final judicial settlement of the Consent Decree is entered by the Court no later than December 1, 2018.

The second round of aerial herbicide treatments would be scheduled mid- to late-August 2019 and the trampling with Marsh Masters would be completed by December 31, 2019. The third round of aerial herbicide treatments would be scheduled mid- to late-August 2020 and the trampling with Marsh Masters would be completed by December 31, 2020.

2.8 SUCCESS CRITERIA

A. It is recognized and acknowledged by all Parties that Phragmites is an aggressive, invasive species that often regrows after periodic eradication. It is also recognized and acknowledged that the success of any given treatment on Utah Lake can be affected by lake level and water depths, wave action, algae blooms, ice scour and other environmental conditions that cannot be controlled by man. It is also recognized and acknowledged that the treatment areas are surrounded by hundreds of acres of existing Phragmites located along the Utah Lake shorelands which can provide source seeds and vegetative propagules for recolonization of treated areas. For these reasons, the success of the Phragmites treatment will be based on the implementation of the treatment methods identified in Part B of this plan. Regrowth of Phragmites in the treatment areas shall not be considered a failure to meet success criteria.

B. The EPA and USACE will be notified annually via email within 10 days of completing the annual herbicide treatments for the two Phragmites control areas.

C. The EPA and USACE will be notified via annually via email with 10 days of completing the trampling with the Marsh Masters equipment.

D. Upon completion of the first round of annual treatments, the EPA and USACE will be requested to conduct an on-site inspection to confirm the Phragmites control work has been completed. Upon completion of the on-site site inspection, the EPA and USACE will be requested to provide email correspondence that confirms that Part B work to control Phragmites has been completed.

E. Aerial drone videography and/or still photographs shall be submitted annually to the EPA and USACE within 90 days of completing the annual Phragmites trampling. The aerial drone videography and/or still photographs will provide photographic evidence that the three (3) annual treatments to control Phragmites have been completed.

2.9 MONITORING AND REPORTING PROCEDURES

A. Aerial drone videography and/or still photography of the Phragmites treatment areas will be done following the first-round of trampling to document the size and locations of the two treatment areas. The aerial drone data will be incorporated into an as-built report to

document the completion of the first round of the Phragmites control work as described in Sections 1.10.A and 1.10.B of this Plan.

B. For the Part B work, the as-built report will include documentation that verifies the treated boundaries and acreage of the two Phragmites control treatment areas.

C. Annual post-treatment monitoring of the Phragmites control treatment areas will be done concurrent with the monitoring done for the fill removal and wetlands restoration area.

D. Monitoring will be done in July and will entail the use of aerial drone videography and/or still photographs to document the revegetation of wetland vegetation in the Phragmites treatment areas. The aerial drone imagery will be used to estimate percent areal revegetation cover. No transect or quadrat measurements will be done to collect quantitative data for plant species composition, species richness, relative abundance, or other floristic measurements. Rather, the aerial drone imagery will be the basis for interpolating revegetation within the Phragmites treatment areas.

C. The aerial drone imagery will be used to produce maps and illustrate the progression of revegetation in the two treatment areas. A Phragmites treatment section will be included in the annual monitoring report that is described in Section 1.10 for the fill removal and wetlands restoration work.

D. As discussed in Section 2.3.L of this Plan, the two Phragmites treatment areas will be monitored in July 2021 to determine the percent of native wetland plants vs. non-native Phragmites regrowth. This will be accomplished by randomly placing five 10x10-foot square vegetation monitoring quadrats in each treatment area (ten quadrats total). The percentage of Phragmites cover relative to total plant cover will be visually estimated and photo documented in each quadrat and recorded on a customized data sheet that will include the geo-coordinate location (UTM or lat./long.) of the quadrat within the treatment area. Percent total Phragmites cover will be averaged for the five quadrats in each treatment area. If Phragmites is more than 30% of the average plant cover for the treatment area, the treatment area will be seeded with a native wetland plant mix in the autumn. Reseeding would be done using a broadcast method consistent with guidelines specified in *How to Restore Phragmites-invaded Wetlands* (Rohal et al., 2017). Copies of the seed mix receipts and application rates and photo documentation of the reseeding application will be provided to EPA if reseeding is required.

E. The revegetation monitoring results and reseeding will be included in the 2021 annual monitoring report.

2.10 EPA INSPECTION PROCEDURES

A. As per paragraph 26 of the Consent Decree, the EPA and/or USACE may conduct site visits to inspect the progress of the Phragmites control treatment work. In most circumstances, the EPA and USACE will attempt to provide no less than 1 week prior notice to Cross Marine and the SSOA.

B. When EPA and/or USACE provide notice of an impending site visit, Cross Marine and the SSOA will be given the opportunity to attend the subject site inspections.

3.0 REFERENCES CITED

Bowen Collins & Associates, Inc. 2012. *Saratoga Springs Marina Wetland Delineation.* Prepared for Saratoga Springs Home Owners Association. January 2012.

Horrocks Engineers. 2010. *Saratoga Springs Owners Association Restoration Plan Monitoring Report #2.* Prepared for Saratoga Springs Owners Association. October 2010.

Rohal, C., K. Hambrecht, C. Cranney, and K. Kettenring. 2017. How to Restore Phragmites-Invaded Wetlands. Utah Agricultural Experiment Station Research Report 224. Logan, UT.

U.S. Army Corps of Engineers (USACE). 2008. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0). ERDC/EL TR-08-28.* Vicksburg, MS: U.S. Army Engineer Research and Development Center.

APPENDIX A

Fill Removal and Wetlands Restoration Plan View Map

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APPENDIX B

Appendix B: Existing Site Conditions Documentation

Wetland Delineation Data Forms

Test Pit Profile Data

Level Station Surface Elevations Data

Photo Logs

WETLAND DETERMINATION DATA FORM - Arid West Region – Version 2.0

Project/Site: Cross Marine Fill Removal & Wetlands Restoration Plan	City/County: Saratoga Springs/Utah	Sampling Date: June 1, 2018
Applicant/Owner: Jim Cross	State: Utah	Sampling Point: 1A
Investigator(s): D. Wenger, K. Schmid, C. Boyer	Section, Township, Range: S25 T5S R1W	WETLAND
Landform (hillslope, terrace, etc.): Lake floodplain	Local relief (concave, convex, none): None	Slope (%): 0
Subregion (LRR): Interior Deserts (LRRD) Lat: 40.348545	Long: -111.904824	Datum: WGS84
Soil Map Unit Name: Water (W)	NWI classification: PSSC	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes: X No:	(If no, explain in Remarks.)	
Are Vegetation N ,Soil N , or Hydrology N Significantly disturbed?	Are "Normal Circumstances" present? Yes: X	No:
Are Vegetation N ,Soil N , or Hydrology N Naturally problematic?	(If needed, explain any answers in Remarks.)	

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes: X	No:	**Is the Sampled Area within a Wetland?**	**Yes: X No:**
Hydric Soil Present?	Yes: X	No:		
Wetland Hydrology Present?	Yes: X	No:		

Remarks: Wetland Sample Point 1A is in existing wetland approximately 1.5 feet lower than upland Sample Point 1B on adjacent fill slope.

VEGETATION - Use scientific names of plants

Tree Stratum (Plot Size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot Size:_____)			
1.			
2.			
3.			
4.			
	0	= Total Cover	
Herb Stratum (Plot Size: 5 ft.)			
1. Phragmites australis	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:_____)			
1.			
2.			
Total Cover: 0			
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:	
OBL species:	0	x 1=	0
FACW species:	100	x 2 =	200
FAC species:	0	x 3 =	0
FACU species:	0	x 4 =	0
UPL species:	0	x 5 =	0
Column Totals:	100 (A)		200 (B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

- Dominance Test >50%
- Prevalence Index is ≤3.0[1]
- Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes: X No:**

Remarks: FACW dominated plant community consisting of Phragmites.

SOILS

Sampling Point: 1A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.) **WETLAND**

Depth (inches)	Matrix		Redox Features				Texture	Remarks
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]		
0-4	10YR 5/2	100	10YR 4/6	5	C	PL	Silty sand	5% redox, saturated
4-8	GLEY 1 2.5/N	50					Silt loam	Saturated
	2.5Y 2.5/1	50					Silt loam	Saturated
8-15	GLEY 1 2.5/N	40					Silt loam	20% Gravel
	2.5Y 2.5/1	40					Silt loam	
15-18+	2.5Y 3/1	60					Silt loam	40% Gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS+Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)			**Indicators for Problematic Hydric Soils[3]:**
	Histosol (A1)	Sandy Redox (S5)	1 cm Muck (A9) (**LRR C**)
	Histic Epipedon (A2)	Stripped Matrix (S6)	2 cm Muck (A10) (**LRR B**)
	Black Histic (A3)	Loamy Mucky Mineral (F1)	Reduced Vertic (F18)
	Hydrogen Sulfide (A4)	Loamy Gleyed Matrix (F2)	Red Parent Material (TF2)
	Stratified Layers (A5) (**LRR C**)	X Depleted Matrix (F3)	Other (Explain in Remarks)
	1 cm Muck (A9) (**LRR D**)	Redox Dark Surface (F6)	
	Depleted Below Dark Surface (A11)	Depleted Dark Surface (F7)	
	Thick Dark Surface (A12)	Redox Depressions (F8)	[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.
	Sandy Mucky Mineral (S1)	Vernal Pools (F9)	
	Sandy Gleyed Matrix (S4)		

Restrictive Layer (if present):		
Type:	**Hydric Soil Present?**	**Yes: X No:**
Depth (inches):		

Remarks: Depleted layer from 0"-3" containing 5% redox concentrations.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)			Secondary Indicators (2 or more required)
X	Surface Water (A1)	Salt Crust (B11)	Water Marks (B1) (**Riverine**)
X	High Water Table (A2)	Biotic Crust (B12)	Sediment Deposits (B2) (**Riverine**)
X	Saturation (A3)	Aquatic Invertebrates (B13)	Drift Deposits (B3) (**Riverine**)
	Water Marks (B1) (**Nonriverine**)	Hydrogen Sulfide Odor (C1)	Drainage patterns (B10)
	Sediment Deposits (B2) (**Nonriverine**)	Oxidized Rhizospheres along Living Roots (C3)	Dry-Season Water Table (C2)
	Drift Deposits (B3) (**Nonriverine**)	Presence of Reduced Iron (C4)	Crayfish Burrows (C8)
	Surface Soil Cracks (B6)	Recent Iron Reduction in Plowed Soils (C6)	Saturation Visible on Aerial Imagery (C9)
	Inundation Visible on Aerial Imagery	Thin Muck Surface (C7)	Shallow Aquitard (D3)
	Water-Stained Leaves (B9)	Other (Explain in Remarks)	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes:	X	No		Depth (inches):	+1"	**Wetland Hydrology Present?** **Yes: X No:**
Water Table Present?	Yes:	X	No		Depth (inches):	4"	
Saturation Present? (incl. capillary fringe)	Yes:	X	No		Depth (inches):	4"	

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 1" of surface water around pit. Water filled in pit to a depth of 4" below the surface.

WETLAND DETERMINATION DATA FORM - Arid West Region – Version 2.0

Project/Site: Cross Marine Fill Removal & Wetlands Restoration Plan	City/County: Saratoga Springs/Utah	Sampling Date: June 1, 2018
Applicant/Owner: Jim Cross	State: Utah	Sampling Point: 1B
Investigator(s): D. Wenger, K. Schmid, C. Boyer	Section, Township, Range: S25 T5S R1W	UPLAND
Landform (hillslope, terrace, etc.): Lake floodplain	Local relief (concave, convex, none): None	Slope (%): 0
Subregion (LRR): Interior Deserts (LRRD) Lat: 40.348555	Long: -111.904779	Datum: WGS84
Soil Map Unit Name: Water (W)	NWI classification: PSSC	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes: X No:	(If no, explain in Remarks.)	
Are Vegetation Y ,Soil Y , or Hydrology Y Significantly disturbed?	Are "Normal Circumstances" present? Yes:	No: X
Are Vegetation N ,Soil N , or Hydrology N Naturally problematic?	(If needed, explain any answers in Remarks.)	

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes:	No: X	**Is the Sampled Area within a Wetland?** **Yes:** **No: X**
Hydric Soil Present?	Yes:	No: X	
Wetland Hydrology Present?	Yes:	No: X	

Remarks: Upland Sample Point 1B taken in disturbed fill area, approximately 1.5 feet higher than wetland Sample Point 1A.

VEGETATION - Use scientific names of plants

Tree Stratum (Plot Size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot Size:_____)			
1.			
2.			
3.			
4.			
	0	= Total Cover	
Herb Stratum (Plot Size: 5 ft.)			
1. Chenopodium album	40	Y	FACU
2. Phragmites australis	30	Y	FACW
3. Bromus arvensis	15	N	FACU
4. Unknown forb	15	N	
5.			
6.			
7.			
8.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:_____)			
1.			
2.			
Total Cover: 0			
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 2 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL species:	0	x 1=	0	0
FACW species:	30	x 2 =	60	
FAC species:	0	x 3 =	0	
FACU species:	55	x 4 =	220	
UPL species:	0	x 5 =	0	
Column Totals:	85	(A)	280	(B)

Prevalence Index = B/A = 3.29

Hydrophytic Vegetation Indicators:

Dominance Test >50%

Prevalence Index is ≤3.0[1]

Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes:** **No: X**

Remarks: FACU and FACW dominated plant community. Does not meet dominance test or prevalence index. Phragmites in adjacent wetland is spreading rhizomatously onto upland fill slope.

SOILS

Sampling Point: 1B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.) **UPLAND**

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/3	100					Sandy/Silt loam	Fibrous root zone
4-5	7.5?YR 5/4	100					Sandy/Silt loam	Dry, no redox
5-18+	7.5YR 5/4	20					Sandy/Silt loam	Dry, no redox
	10YR 4/3	80					Sandy/Silt loam	Dry, no redox

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS+Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (**LRR C**)
- 1 cm Muck (A9) (**LRR D**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- 1 cm Muck (A9) (**LRR C**)
- 2 cm Muck (A10) (**LRR B**)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes:** **No: X**

Remarks: No hydric soil indicators. Entire profile is dry and friable. Sand/silt loam is believed to be imported fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (**Nonriverine**)
- Sediment Deposits (B2) (**Nonriverine**)
- Drift Deposits (B3) (**Nonriverine**)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Plowed Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water Marks (B1) (**Riverine**)
- Sediment Deposits (B2) (**Riverine**)
- Drift Deposits (B3) (**Riverine**)
- Drainage patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes: ____ No X Depth (inches): ____

Water Table Present? Yes: ____ No X Depth (inches): ____

Saturation Present? (incl. capillary fringe) Yes: ____ No X Depth (inches): ____

Wetland Hydrology Present? **Yes:** **No: X**

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No wetland hydrology indicators.

WETLAND DETERMINATION DATA FORM - Arid West Region – Version 2.0

Project/Site: Cross Marine Fill Removal & Wetlands Restoration Plan	City/County: Saratoga Springs/Utah	Sampling Date: June 1, 2018
Applicant/Owner: Jim Cross	State: Utah	Sampling Point: 2A
Investigator(s): D. Wenger, K. Schmid, C. Boyer	Section, Township, Range: S25 T5S R1W	WETLAND
Landform (hillslope, terrace, etc.): Lake floodplain	Local relief (concave, convex, none): None	Slope (%): 0
Subregion (LRR): Interior Deserts (LRRD) Lat: 40.348099	Long: -111.904660	Datum: WGS84
Soil Map Unit Name: Water (W)	NWI classification: PSSC	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes: X No:	(If no, explain in Remarks.)	
Are Vegetation N ,Soil N , or Hydrology N Significantly disturbed?	Are "Normal Circumstances" present? Yes: X	No:
Are Vegetation N ,Soil N , or Hydrology N Naturally problematic?	(If needed, explain any answers in Remarks.)	

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes: X	No:	**Is the Sampled Area within a Wetland?**	**Yes: X No:**
Hydric Soil Present?	Yes: X	No:		
Wetland Hydrology Present?	Yes: X	No:		

Remarks: Wetland Sample Point 2A is in existing wetland approximately 1.5 feet lower than upland Sample Point 2B on adjacent fill slope.

VEGETATION - Use scientific names of plants

Tree Stratum (Plot Size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot Size:_____)			
1.			
2.			
3.			
4.			
	0	= Total Cover	
Herb Stratum (Plot Size: 5 ft.)			
1. Eleocharis palustris	80	Y	OBL
2. Phragmites australis	15	N	FACW
3. Schoenoplectus pungens	10	N	OBL
4. Juncus torreyi	T	N	FACW
5. Schoenoplectus maritimus	T	N	OBL
6.			
7.			
8.			
	105	= Total Cover	
Woody Vine Stratum (Plot Size:_____)			
1.			
2.			
Total Cover: 0			
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL species:	90	x 1=	90	
FACW species:	15	x 2 =	30	
FAC species:	0	x 3 =	0	
FACU species:	0	x 4 =	0	
UPL species:	0	x 5 =	0	
Column Totals:	105	(A)	120	(B)

Prevalence Index = B/A = 1.14

Hydrophytic Vegetation Indicators:

Dominance Test >50%

Prevalence Index is ≤3.0[1]

Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes: X No:**

Remarks: OBL dominated plant community.

SOILS

Sampling Point: 2A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.) **WETLAND**

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/1	100					Sandy loam	Root zone
4-12	2.5Y 5/1	100					Loam	Saturated
12-19	2.5Y /61	100					Gravel/Clay	Saturated

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS+Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

	Histosol (A1)		Sandy Redox (S5)
	Histic Epipedon (A2)		Stripped Matrix (S6)
	Black Histic (A3)		Loamy Mucky Mineral (F1)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)
	Stratified Layers (A5) (**LRR C**)	X	Depleted Matrix (F3)
	1 cm Muck (A9) (**LRR D**)		Redox Dark Surface (F6)
	Depleted Below Dark Surface (A11)		Depleted Dark Surface (F7)
	Thick Dark Surface (A12)		Redox Depressions (F8)
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)
	Sandy Gleyed Matrix (S4)		

Indicators for Problematic Hydric Soils[3]:

1 cm Muck (A9) (**LRR C**)
2 cm Muck (A10) (**LRR B**)
Reduced Vertic (F18)
Red Parent Material (TF2)
Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes: X** **No:**

Remarks: Depleted matrix in 4"-12" layer.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)			Secondary Indicators (2 or more required)	
X	Surface Water (A1)	Salt Crust (B11)		Water Marks (B1) (**Riverine**)
X	High Water Table (A2)	Biotic Crust (B12)		Sediment Deposits (B2) (**Riverine**)
X	Saturation (A3)	Aquatic Invertebrates (B13)		Drift Deposits (B3) (**Riverine**)
	Water Marks (B1) (**Nonriverine**)	Hydrogen Sulfide Odor (C1)		Drainage patterns (B10)
	Sediment Deposits (B2) (**Nonriverine**)	Oxidized Rhizospheres along Living Roots (C3)		Dry-Season Water Table (C2)
	Drift Deposits (B3) (**Nonriverine**)	Presence of Reduced Iron (C4)		Crayfish Burrows (C8)
	Surface Soil Cracks (B6)	Recent Iron Reduction in Plowed Soils (C6)		Saturation Visible on Aerial Imagery (C9)
	Inundation Visible on Aerial Imagery	Thin Muck Surface (C7)		Shallow Aquitard (D3)
	Water-Stained Leaves (B9)	Other (Explain in Remarks)		FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes:	X	No		Depth (inches):	+0.5"	**Wetland Hydrology Present?** **Yes: X** **No:**
Water Table Present?	Yes:	X	No		Depth (inches):	0"	
Saturation Present? (incl. capillary fringe)	Yes:	X	No		Depth (inches):	0"	

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: 0.5" of surface water. Water filled in pit to soil surface.

WETLAND DETERMINATION DATA FORM - Arid West Region – Version 2.0

Project/Site: Cross Marine Fill Removal & Wetlands Restoration Plan	City/County: Saratoga Springs/Utah	Sampling Date: June 1, 2018
Applicant/Owner: Jim Cross	State: Utah	Sampling Point: 2B
Investigator(s): D. Wenger, K. Schmid, C. Boyer	Section, Township, Range: S25 T5S R1W	UPLAND
Landform (hillslope, terrace, etc.): Lake floodplain	Local relief (concave, convex, none): None	Slope (%): 0
Subregion (LRR): Interior Deserts (LRRD) Lat: 40.348127	Long: -111.904634	Datum: WGS84
Soil Map Unit Name: Water (W)	NWI classification: PSSC	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes: X No:	(If no, explain in Remarks.)	
Are Vegetation Y ,Soil Y , or Hydrology Y Significantly disturbed?	Are "Normal Circumstances" present? Yes:	No: X
Are Vegetation Y ,Soil N , or Hydrology N Naturally problematic?	(If needed, explain any answers in Remarks.)	

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes: X	No:	**Is the Sampled Area within a Wetland?**	**Yes:** **No:**
Hydric Soil Present?	Yes:	No: X		
Wetland Hydrology Present?	Yes:	No: X		

Remarks: Upland Sample Point 2B is taken in disturbed fill area and is approximately 1.5 feet higher than adjacent wetland Sample Point 2A. Phragmites from adjacent wetland is spreading onto adjacent upland fill slope and is 10% dominant.

VEGETATION - Use scientific names of plants

Tree Stratum (Plot Size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot Size:_____)			
1.			
2.			
3.			
4.			
	0	= Total Cover	
Herb Stratum (Plot Size: 5 ft.)			
1. Phragmites australis	100	Y	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:_____)			
1.			
2.			
Total Cover: 0			
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL species:	0	x 1=	0	
FACW species:	100	x 2 =	200	
FAC species:	0	x 3 =	0	
FACU species:	0	x 4 =	0	
UPL species:	0	x 5 =	0	
Column Totals:	100	(A)	200	(B)

Prevalence Index = B/A = 2.00

Hydrophytic Vegetation Indicators:

Dominance Test >50%

Prevalence Index is ≤3.0[1]

Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes:** **No: X**

Remarks: FACW dominated plant community consisting of invasive Phramgites is spreading onto fill slope from adjacent wetland.

SOILS

Sampling Point: 2B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.) **UPLAND**

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-6	10YR 5/3	100					Sand/Gravel/Silt	Dry
6-18	10YR 5/6	100					Silt loam	Dry
18-20+	2.5Y 4/1	100					Clay	Charcoal found, moist

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS+Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

Histosol (A1)	Sandy Redox (S5)	1 cm Muck (A9) (**LRR C**)
Histic Epipedon (A2)	Stripped Matrix (S6)	2 cm Muck (A10) (**LRR B**)
Black Histic (A3)	Loamy Mucky Mineral (F1)	Reduced Vertic (F18)
Hydrogen Sulfide (A4)	Loamy Gleyed Matrix (F2)	Red Parent Material (TF2)
Stratified Layers (A5) (**LRR C**)	Depleted Matrix (F3)	Other (Explain in Remarks)
1 cm Muck (A9) (**LRR D**)	Redox Dark Surface (F6)	
Depleted Below Dark Surface (A11)	Depleted Dark Surface (F7)	
Thick Dark Surface (A12)	Redox Depressions (F8)	
Sandy Mucky Mineral (S1)	Vernal Pools (F9)	
Sandy Gleyed Matrix (S4)		

Indicators for Problematic Hydric Soils[3]:

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes:** **No: X**

Remarks: No hydric soil indicators present. Soil is believed to be imported fill material.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)		Secondary Indicators (2 or more required)
Surface Water (A1)	Salt Crust (B11)	Water Marks (B1) (**Riverine**)
High Water Table (A2)	Biotic Crust (B12)	Sediment Deposits (B2) (**Riverine**)
Saturation (A3)	Aquatic Invertebrates (B13)	Drift Deposits (B3) (**Riverine**)
Water Marks (B1) (**Nonriverine**)	Hydrogen Sulfide Odor (C1)	Drainage patterns (B10)
Sediment Deposits (B2) (**Nonriverine**)	Oxidized Rhizospheres along Living Roots (C3)	Dry-Season Water Table (C2)
Drift Deposits (B3) (**Nonriverine**)	Presence of Reduced Iron (C4)	Crayfish Burrows (C8)
Surface Soil Cracks (B6)	Recent Iron Reduction in Plowed Soils (C6)	Saturation Visible on Aerial Imagery (C9)
Inundation Visible on Aerial Imagery	Thin Muck Surface (C7)	Shallow Aquitard (D3)
Water-Stained Leaves (B9)	Other (Explain in Remarks)	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes: ____	No X	Depth (inches): ____	**Wetland Hydrology Present?**	**Yes:** **No: X**
Water Table Present?	Yes: ____	No X	Depth (inches): ____		
Saturation Present? (incl. capillary fringe)	Yes: ____	No X	Depth (inches): ____		

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No wetland hydrology indicators present.

WETLAND DETERMINATION DATA FORM - Arid West Region – Version 2.0

Project/Site: Cross Marine Fill Removal & Wetlands Restoration Plan	City/County: Saratoga Springs/Utah	Sampling Date: June 1, 2018
Applicant/Owner: Jim Cross	State: Utah	Sampling Point: 3A
Investigator(s): D. Wenger, K. Schmid, C. Boyer	Section, Township, Range: S25 T5S R1W	WETLAND
Landform (hillslope, terrace, etc.): Lake floodplain	Local relief (concave, convex, none): None	Slope (%): 0
Subregion (LRR): Interior Deserts (LRRD) Lat: 40.348241	Long: -111.904907	Datum: WGS84
Soil Map Unit Name: Water (W)	NWI classification: PSSC	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes: X No:	(If no, explain in Remarks.)	
Are Vegetation N ,Soil N , or Hydrology N Significantly disturbed?	Are "Normal Circumstances" present? Yes: X	No:
Are Vegetation N ,Soil N , or Hydrology N Naturally problematic?	(If needed, explain any answers in Remarks.)	

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes: X	No:	**Is the Sampled Area within a Wetland?**	**Yes: X No:**
Hydric Soil Present?	Yes: X	No:		
Wetland Hydrology Present?	Yes: X	No:		

Remarks: Wetland Sample Point 3A in existing wetland is approximately 2.5 feet lower than upland Sample Point 3B.

VEGETATION - Use scientific names of plants

Tree Stratum (Plot Size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot Size:_____)			
1.			
2.			
3.			
4.			
	0	= Total Cover	
Herb Stratum (Plot Size: 5 ft.)			
1. Phragmites australis	90	Y	FACW
2. Elymus repens	10	N	FAC
3. Cirsium arvense	T	N	FACU
4.			
5.			
6.			
7.			
8.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:_____)			
1.			
2.			
Total Cover: 0			
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 1 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL species:	0	x 1=	0	
FACW species:	90	x 2 =	180	
FAC species:	10	x 3 =	30	
FACU species:	0	x 4 =	0	
UPL species:	0	x 5 =	0	
Column Totals:	100	(A)	210	(B)

Prevalence Index = B/A = 2.10

Hydrophytic Vegetation Indicators:

Dominance Test >50%

Prevalence Index is ≤3.0[1]

Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes: X No:**

Remarks: Plant community is dominated by invasive Phragmites.

SOILS

Sampling Point: 3A

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.) **WETLAND**

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-7	5Y 2.5/1	100					Silt loam	Root zone
7-14+	10YR 5/1	80					Clay	20% gravel
14-18+	10YR 5/1	90					Sand	Root layer from 14"-15"
								10% gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS+Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

	Histosol (A1)		Sandy Redox (S5)
	Histic Epipedon (A2)		Stripped Matrix (S6)
	Black Histic (A3)		Loamy Mucky Mineral (F1)
	Hydrogen Sulfide (A4)		Loamy Gleyed Matrix (F2)
	Stratified Layers (A5) (**LRR C**)	X	Depleted Matrix (F3)
	1 cm Muck (A9) (**LRR D**)		Redox Dark Surface (F6)
	Depleted Below Dark Surface (A11)		Depleted Dark Surface (F7)
	Thick Dark Surface (A12)		Redox Depressions (F8)
	Sandy Mucky Mineral (S1)		Vernal Pools (F9)
	Sandy Gleyed Matrix (S4)		

Indicators for Problematic Hydric Soils[3]:

1 cm Muck (A9) (**LRR C**)
2 cm Muck (A10) (**LRR B**)
Reduced Vertic (F18)
Red Parent Material (TF2)
Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes: X** **No:**

Remarks: Depleted layer from 7"-14".

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)			Secondary Indicators (2 or more required)
	Surface Water (A1)	Salt Crust (B11)	Water Marks (B1) (**Riverine**)
X	High Water Table (A2)	Biotic Crust (B12)	Sediment Deposits (B2) (**Riverine**)
X	Saturation (A3)	Aquatic Invertebrates (B13)	Drift Deposits (B3) (**Riverine**)
	Water Marks (B1) (**Nonriverine**) X	Hydrogen Sulfide Odor (C1)	Drainage patterns (B10)
	Sediment Deposits (B2) (**Nonriverine**)	Oxidized Rhizospheres along Living Roots (C3)	Dry-Season Water Table (C2)
	Drift Deposits (B3) (**Nonriverine**)	Presence of Reduced Iron (C4)	Crayfish Burrows (C8)
	Surface Soil Cracks (B6)	Recent Iron Reduction in Plowed Soils (C6)	Saturation Visible on Aerial Imagery (C9)
	Inundation Visible on Aerial Imagery	Thin Muck Surface (C7)	Shallow Aquitard (D3)
	Water-Stained Leaves (B9)	Other (Explain in Remarks)	FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes:	___	No	X	Depth (inches):	
Water Table Present?	Yes:	X	No	___	Depth (inches):	11"
Saturation Present? (incl. capillary fringe)	Yes:	X	No		Depth (inches):	0"

Wetland Hydrology Present? **Yes: X** **No:**

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Saturation throughout entire soil profile. Water filled in pit to a depth of 11" below the surface.

WETLAND DETERMINATION DATA FORM - Arid West Region – Version 2.0

Project/Site: Cross Marine Fill Removal & Wetlands Restoration Plan	City/County: Saratoga Springs/Utah	Sampling Date: June 1, 2018
Applicant/Owner: Jim Cross	State: Utah	Sampling Point: 3B
Investigator(s): D. Wenger, K. Schmid, C. Boyer	Section, Township, Range: S25 T5S R1W	
Landform (hillslope, terrace, etc.): Lake floodplain	Local relief (concave, convex, none): None	Slope (%): 0
Subregion (LRR): Interior Deserts (LRRD) Lat: 40.348244	Long: -111.904841	Datum: WGS84
Soil Map Unit Name: Water (W)	NWI classification: PSSC	
Are climatic / hydrologic conditions on the site typical for this time of year? Yes: X No:	(If no, explain in Remarks.)	
Are Vegetation Y ,Soil Y , or Hydrology Y Significantly disturbed?	Are "Normal Circumstances" present? Yes:	No: X
Are Vegetation N ,Soil N , or Hydrology N Naturally problematic?	(If needed, explain any answers in Remarks.)	

SUMMARY OF FINDINGS - Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes:	No: X	**Is the Sampled Area within a Wetland?** **Yes:** **No: X**
Hydric Soil Present?	Yes:	No: X	
Wetland Hydrology Present?	Yes:	No: X	

Remarks: Upland Sample Point 3B is approximately 2.5 feet higher than adjacent wetland Sample Point 3A.

VEGETATION - Use scientific names of plants

Tree Stratum (Plot Size:_____)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
	0	= Total Cover	
Sapling/Shrub Stratum (Plot Size:_____)			
1.			
2.			
3.			
4.			
	0	= Total Cover	
Herb Stratum (Plot Size: 5 ft.)			
1. Phragmites australis	20	Y	FACW
2. Hordeum murinum	20	Y	FACU
3. Hordeum pusillum	20	Y	FACU
4. Hordeum jubatum	15	N	FAC
5. Foxtail sp.	13	N	
6. Melilotus officinalis	10	N	FACW
7. Agrostis stolonifera	2	N	FACW
8.			
	100	= Total Cover	
Woody Vine Stratum (Plot Size:_____)			
1.			
2.			
Total Cover: 0			
% Bare Ground in Herb Stratum 0	% Cover of Biotic Crust		

Dominance Test Worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 1 (A)

Total Number of Dominant Species Across All Strata: 3 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33% (A/B)

Prevalence Index Worksheet:

Total % Cover of:		Multiply by:		
OBL species:	0	x 1=	0	
FACW species:	32	x 2 =	64	
FAC species:	15	x 3 =	45	
FACU species:	40	x 4 =	160	
UPL species:	0	x 5 =	0	
Column Totals:	87	(A)	269	(B)

Prevalence Index = B/A = 3.09

Hydrophytic Vegetation Indicators:

Dominance Test >50%

Prevalence Index is ≤3.0[1]

Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? **Yes:** **No: X**

Remarks: FACW and FACU dominated plant community. Does not meet dominance test or prevalence index. Phragmites from existing wetland is spreading onto adjacent fill slope.

SOILS

Sampling Point: 3B

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.) **UPLAND**

Depth (inches)	Matrix		Redox Features					
	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10YR 4/2	80					Sand/Silt loam	20% gravel
4-11	10YR 4/2	100					Clay	Dry
11-18+	10YR 4/2	20					Clay	20% gravel
	7.5YR 5/4	60					Clay	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS+Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- Histosol (A1)
- Histic Epipedon (A2)
- Black Histic (A3)
- Hydrogen Sulfide (A4)
- Stratified Layers (A5) (**LRR C**)
- 1 cm Muck (A9) (**LRR D**)
- Depleted Below Dark Surface (A11)
- Thick Dark Surface (A12)
- Sandy Mucky Mineral (S1)
- Sandy Gleyed Matrix (S4)
- Sandy Redox (S5)
- Stripped Matrix (S6)
- Loamy Mucky Mineral (F1)
- Loamy Gleyed Matrix (F2)
- Depleted Matrix (F3)
- Redox Dark Surface (F6)
- Depleted Dark Surface (F7)
- Redox Depressions (F8)
- Vernal Pools (F9)

Indicators for Problematic Hydric Soils[3]:

- 1 cm Muck (A9) (**LRR C**)
- 2 cm Muck (A10) (**LRR B**)
- Reduced Vertic (F18)
- Red Parent Material (TF2)
- Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if present):

Type:

Depth (inches):

Hydric Soil Present? **Yes:** **No: X**

Remarks: No hydric soil indicators. Entire profile is dry. Soil appears to be clay fill used to seal original harbor dike.

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- Surface Water (A1)
- High Water Table (A2)
- Saturation (A3)
- Water Marks (B1) (**Nonriverine**)
- Sediment Deposits (B2) (**Nonriverine**)
- Drift Deposits (B3) (**Nonriverine**)
- Surface Soil Cracks (B6)
- Inundation Visible on Aerial Imagery
- Water-Stained Leaves (B9)
- Salt Crust (B11)
- Biotic Crust (B12)
- Aquatic Invertebrates (B13)
- Hydrogen Sulfide Odor (C1)
- Oxidized Rhizospheres along Living Roots (C3)
- Presence of Reduced Iron (C4)
- Recent Iron Reduction in Plowed Soils (C6)
- Thin Muck Surface (C7)
- Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- Water Marks (B1) (**Riverine**)
- Sediment Deposits (B2) (**Riverine**)
- Drift Deposits (B3) (**Riverine**)
- Drainage patterns (B10)
- Dry-Season Water Table (C2)
- Crayfish Burrows (C8)
- Saturation Visible on Aerial Imagery (C9)
- Shallow Aquitard (D3)
- FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes: ____ No X Depth (inches): ____

Water Table Present? Yes: ____ No X Depth (inches): ____

Saturation Present? (incl. capillary fringe) Yes: ____ No X Depth (inches): ____

Wetland Hydrology Present? **Yes:** **No: X**

Describe Recorded Data (Stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: No wetland hydrology indicators.

Fill Removal and Wetlands Restoration Plan
Saratoga Springs Harbor, Utah County, Utah
Photos taken: June 1, 2018 - Test Pit A

Photo 6a. Test Pit A.

Photo 6b. Test Pit A overview.

Test Pit: A		
Location Details: Fill Removal Area		
Projection: Latitude/ Longitude		Datum: WGS 1984
Coordinates: 40.348874/-111.904641		
Soil Profile		
Depth (Feet)	**Texture**	**Remarks**
0-3.0	Sandy, Silt, Loam	
3.0-3.5	Gravel	
3.5-4.2	Gravel + Silt	
4.2-5.0	Woody Debris/ Concrete	Fencepost ?
5.0-5.5	Clay	Saturation at 5.0 ft.
5.5-6.2	Gray Sand	Water table at 6.2 ft.
Vegetation		
Common Name	**Scientific Name**	**Indicator Status**
Clasping pepperweed	Lepidium perfoliatum	FACU
Broad-leaf pepperweed	Lepidium latifolium	FAC
Yellow sweet-clover	Melilotus officinalis	FACU
Cheatgrass	Bromus tectorum	UPL
Lamb's-quarters	Chenopodium album	FACU
Bind weed	Convolvulus arvensis	FACU
Hydrology		
	Depth from surface	**Date Inspected**
Saturation	5.0 ft.	6/1/2018
Water Table	6.2 ft.	6/1/2018

Photo 7a. Test Pit B.

Photo 7d. Test Pit B overview.

Test Pit: B		
Location Details: Fill Removal Area		
Projection: Latitude/ Longitude		Datum: WGS 1984
Coordinates: 40.348669/ -111.904735		
Soil Profile		
Depth (Feet)	**Texture**	**Remarks**
0-2.1	Sandy + Silt + Loam	Friable Soil
2.1-3.2	Gravel + Silt + Cobbles	
3.2-4.4	Clay	Saturated at 3.5 ft.
4.4-4.8	Silt + Loam	Water table at 4.0 ft.
Vegetation		
Common Name	**Scientific Name**	**Indicator Status**
Clasping pepperweed	Lepidium perfoliatum	FACU
Broad-leaf pepperweed	Lepidium latifolium	FAC
Cheatgrass	Bromus tectorum	UPL
Lamb's-quarters	Chenopodium album	FACU
Hydrology		
	Depth from surface	**Date Inspected**
Saturation	3.5 ft.	6/1/2018
Water Table	4.0 ft.	6/1/2018

Photo 8a. Test Pit C.

Photo 8b. Test Pit C overview.

Test Pit: C		
Location Details: Fill Removal Area		
Projection: Latitude/ Longitude		Datum: WGS 1984
Coordinates: 40.348568/ -111.904743		
Soil Profile		
Depth (Feet)	**Texture**	**Remarks**
0-3.1	Sandy + Silt + Loam + Roots	Roots zone at surface.Phragmites spreading rhizomatously
3.1-4.1	Clay + Cobbles	Clay is dark gray with black streaking. Saturated in lower portion.
4.1 +	Gravel	Water table at 3.9
Vegetation		
Common Name	**Scientific Name**	**Indicator Status**
Clasping pepperweed	Lepidium perfoliatum	FACU
Cheatgrass	Bromus tectorum	UPL
Lamb's-quarters	Chenopodium album	FACU
Common reed	Phragmites australis	FACW
Field brome	Bromus arvensis	FACU
Crested wheatgrass	Agropyron cristatum	UPL
Hydrology		
	Depth from surface	**Date Inspected**
Saturation	3.1 ft.	6/1/2018
Water Table	3.9 ft.	6/1/2018

Photo 9a. Test Pit D.

Photo 9d. Test Pit D overview.

Test Pit: D		
Location Details: Fill Removal Area		
Projection: Latitude/ Longitude		Datum: WGS 1984
Coordinates: 40.348365/ -111.90473		
Soil Profile		
Depth (Feet)	**Texture**	**Remarks**
0-2.0	Silt + Sand + Loam + Cobbles	Redox present at 1.5 ft.
2.0-2.6	Clay	Saturation at 2.5 ft.
2.6-3.7	Root Zone	Water table at 3.0 ft.
3.7-4.2	Gray Sand	
Vegetation		
Common Name	**Scientific Name**	**Indicator Status**
Lamb's-quarters	Chenopodium album	FACU
Common reed	Phragmites australis	FACW
Alfalfa	Medicago sativa	UPL
Creeping meadow-foxtail	Alopecurus arundinaceus	FAC
Hydrology		
	Depth from surface	**Date Inspected**
Saturation	2.5 ft.	6/1/2018
Water Table	3.0 ft.	6/1/2018

Photo 10a. Test Pit E.

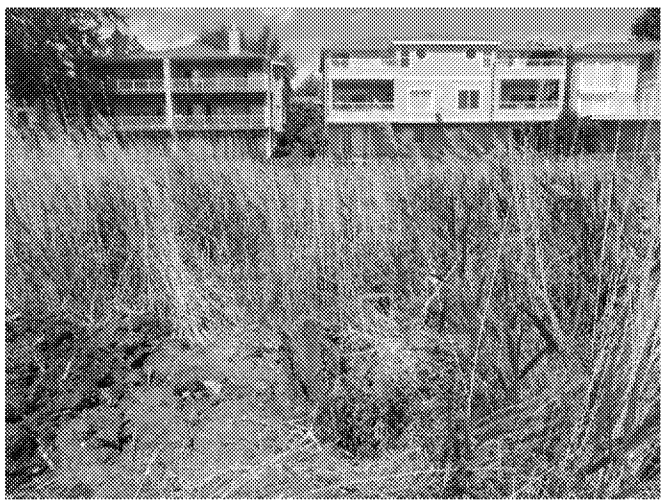


Photo 10b. Test Pit E overview.

Test Pit: E		
Location Details: Fill Removal Area		
Projection: Latitude/ Longitude		Datum: WGS 1984
Coordinates: 40.348246/ -111.904761		
Soil Profile		
Depth (Feet)	**Texture**	**Remarks**
0-2.6	Fine Sand + Loam	Friable Soil
2.6-3.7	Clay	Saturation at 2.6 ft.
3.7-4.1	Fibrouse organic mat	Water table at 3.0 ft.
4.1-4.4	Gray Sand	
Vegetation		
Common Name	**Scientific Name**	**Indicator Status**
Common reed	Phragmites australis	FACW
Alfalfa	Medicago sativa	UPL
Bull thistle	Cirsium vulgare	FACU
Hydrology		
	Depth from surface	**Date Inspected**
Saturation	2.6 ft.	6/1/2018
Water Table	3.0 ft.	6/1/2018

Photo 11a. Test Pit F.

Photo 11b. Test Pit F overview.

Test Pit: F		
Location Details: Fill Removal Area		
Projection: Latitude/ Longitude		Datum: WGS 1984
Coordinates: (40.348163, -111.904777)		
Soil Profile		
Depth (Feet)	**Texture**	**Remarks**
0-2.0	Fine Sand + Loam	Friable Soil
2.0-2.7	Clay	
2.7-3.5	Fibrouse organic mat	Saturation at 3.0 ft. Water table at 3.5 ft.
3.5-4.4	Gray Sand	
Vegetation		
Common Name	**Scientific Name**	**Indicator Status**
Common reed	Phragmites australis	FACW
Alfalfa	Medicago sativa	UPL
Hydrology		
	Depth from surface	**Date Inspected**
Saturation	3.0 ft.	6/1/2018
Water Table	3.5 ft.	6/1/2018

Cross Marine Fill Removal and Wetland Restoration Plan
Saratoga Springs Harbor Area, Utah County, Utah
Surface Elevation Data Points for Level Stations L1 and L2

Level Station L1 set up in fill removal area (40.348371, -111.904697).

Survey Point	Coordinates		Surface Elevation Difference	Location
	Latitude	Longitude		
L1a	-111.905043	40.348343	-1.92	Existing Wetland
L1b	-111.905029	40.348375	-2.00	Existing Wetland
L1c	-111.904921	40.348501	-1.58	Existing Wetland
L1d	-111.904843	40.348554	-1.60	Existing Wetland
L1e	-111.904789	40.348530	-2.20	Existing Wetland
L1f	-111.904779	40.348555	-0.56	Fill Area
L1g	-111.904719	40.348553	+0.08	Fill Area
L1h	-111.904770	40.348475	-1.90	Existing Wetland
L1i	-111.904739	40.348464	-1.80	Existing Wetland
L1j	-111.904735	40.348433	-1.94	Existing Wetland
L1k	-111.904763	40.348420	-1.90	Existing Wetland
L1l	-111.904806	40.348350	-1.39	Fill Area
L1m	-111.904849	40.348351	-2.02	Existing Wetland
L1n	-111.904866	40.348329	-2.52	Existing Wetland
L1o	-111.904887	40.348320	-2.02	Existing Wetland
L1p	-111.904898	40.348280	-1.94	Existing Wetland
L1q	-111.904749	40.348308	-0.24	Fill Area
L1r	-111.904775	40.348252	-1.26	Fill Area
L1s	-111.904870	40.348206	-2.92	Existing Wetland
L1t	-111.904797	40.348154	-1.60	Fill Area
L1u	-111.904848	40.348136	-3.60	Existing Wetland
L1v	-111.904823	40.348108	-3.26	Existing Wetland

Level Station L2 set up on Harbor Dike (40.348241, -111.904587).

Survey Point	Coordinates		Surface Elevation Difference	Location
	Latitude	Longitude		
L2a	-111.904809	40.348204	-0.34	Fill Area
L2b	-111.904799	40.348086	-3.80	Existing Wetland
L2c	-111.904760	40.348058	-3.90	Existing Wetland
L2d	-111.904713	40.348081	-4.12	Existing Wetland
L2e	-111.904649	40.348116	-3.90	Fill Area
L2f	-111.904611	40.348159	-2.00	Fill Area

Photo 1. Southeast view of existing wetland.

Photo 2. West view of existing wetland and location of wetland Sample Point 3A (SP3A).

Photo 3. East view of existing wetland and flowing stream.

Photo 4. East view of stream with flowing water.

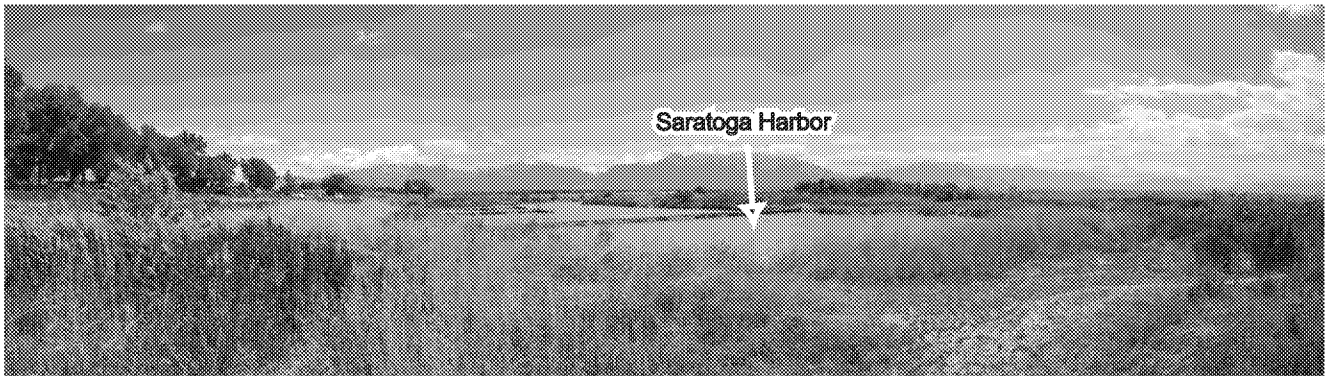


Photo 5. Northeast view of Saratoga Harbor. Taken from top of Harbor Dike.

Photo 6a. Close-up of Test Pit A profile.

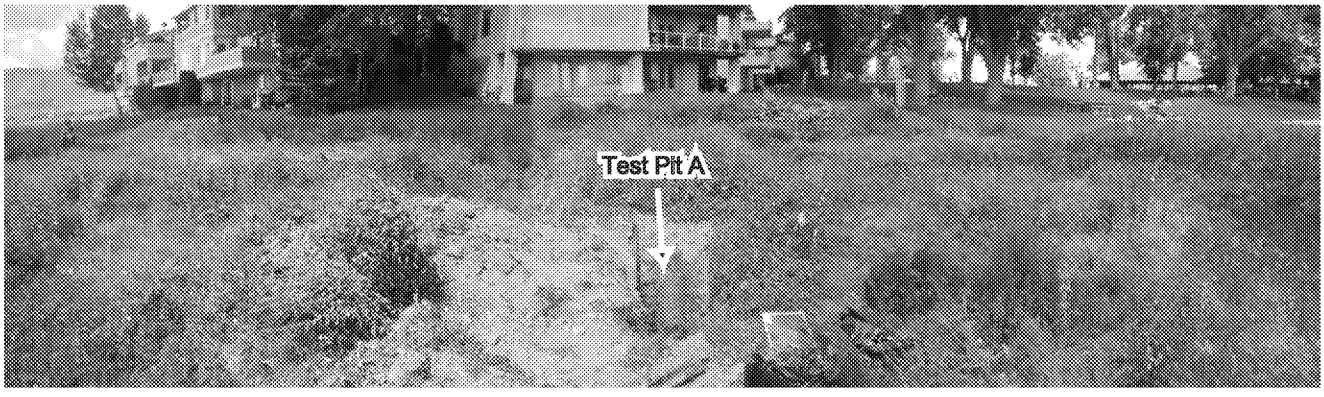


Photo 6b. West view of Test Pit A in fill removal area.

Photo 7a. Close-up of Test Pit B profile.

Photo 7b. West view of excavated soil at Test Pit B. Note Large cobbles excavated from Test Pit B.

Photo 7c. Concrete in Test Pit B.

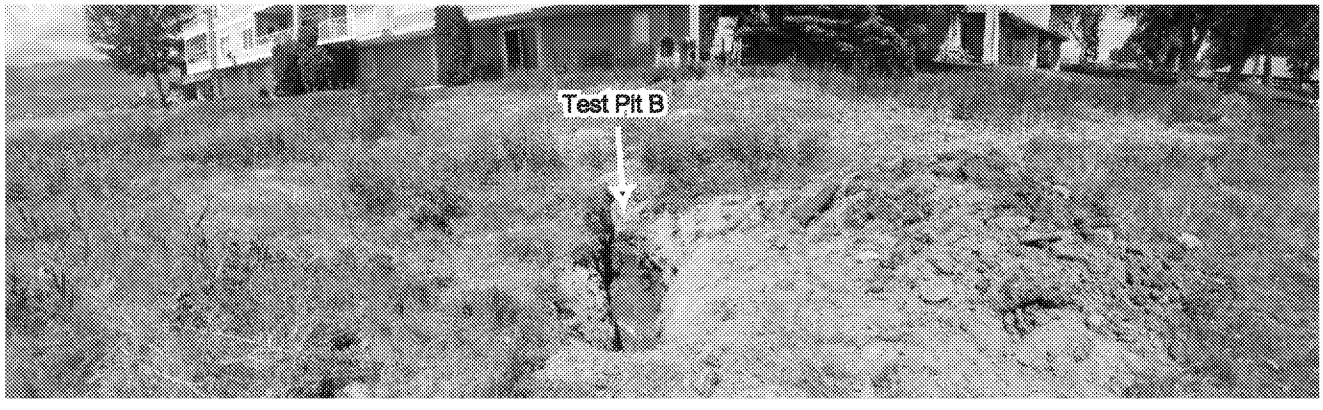


Photo 7d. West view of Test Pit B in fill removal area.

Photo 8a. Close-up of Test Pit C profile.

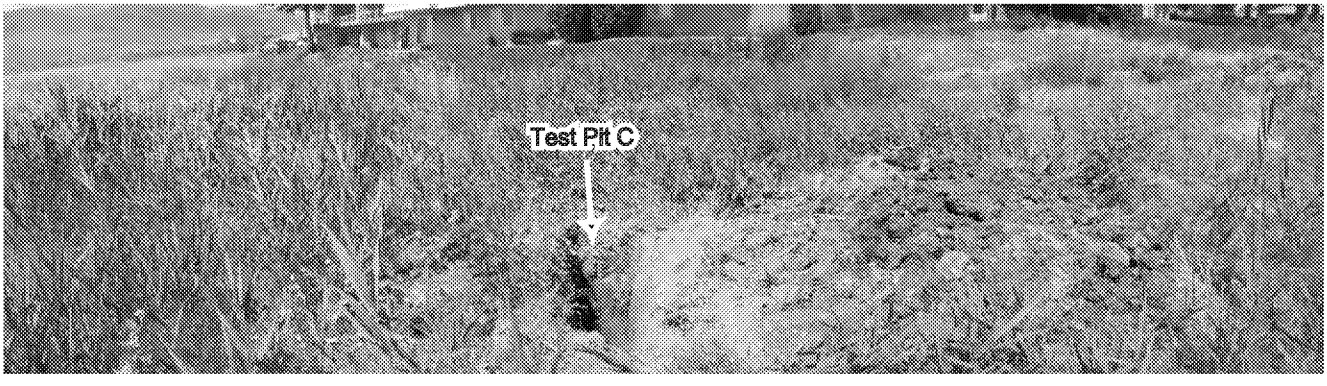


Photo 8b. West view of Test Pit C in fill removal area.

Photo 9a. Close-up of Test Pit D.

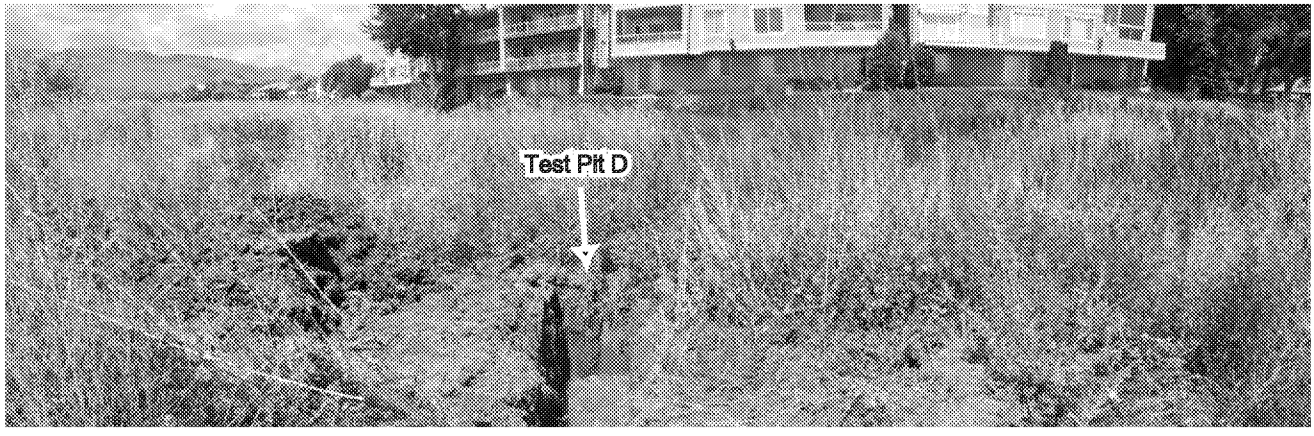


Photo 9b. West view of Test Pit D in fill removal area.

Photo 10a. Close-up of Test Pit E soil profile.

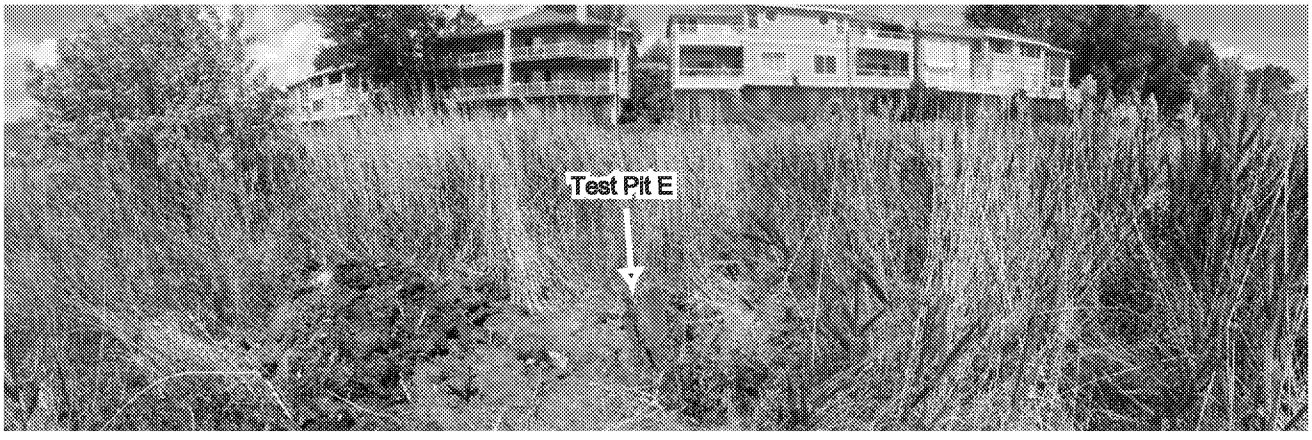


Photo 10b. West view of Test Pit E in fill removal area.

Photo 11a. Close-up of Test Pit F soil profile.

Photo 11b. Close-up of sand layer in Test Pit F at 3.5 ft. below surface.

Photo 11c. Close-up of fibrous organic mat in Test Pit F at 2.7 ft. below surface.

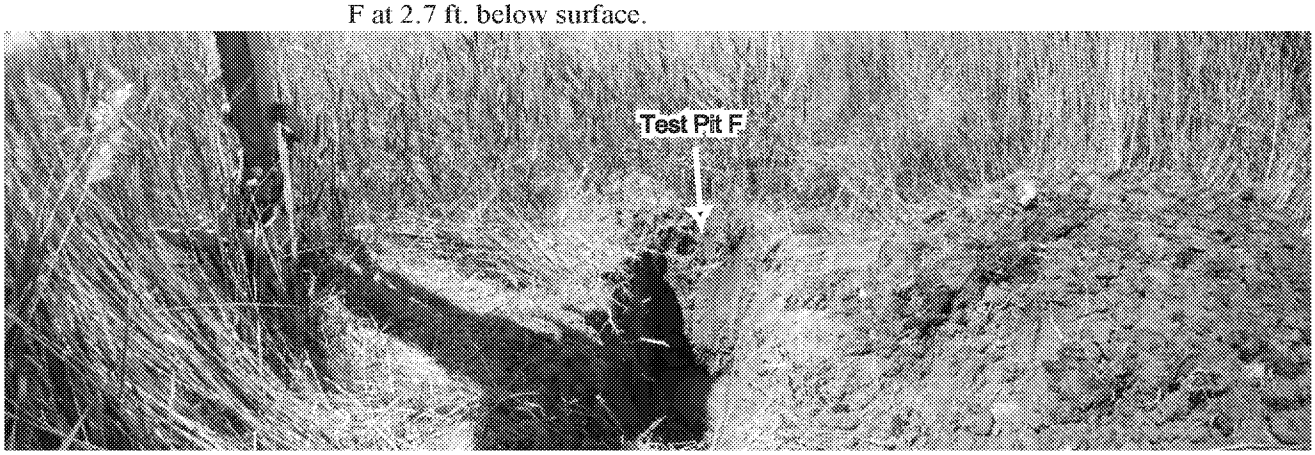


Photo 11d. West view of Test Pit F in fill removal area.

Photo 12a. East view of Fill boundary against existing wetland.

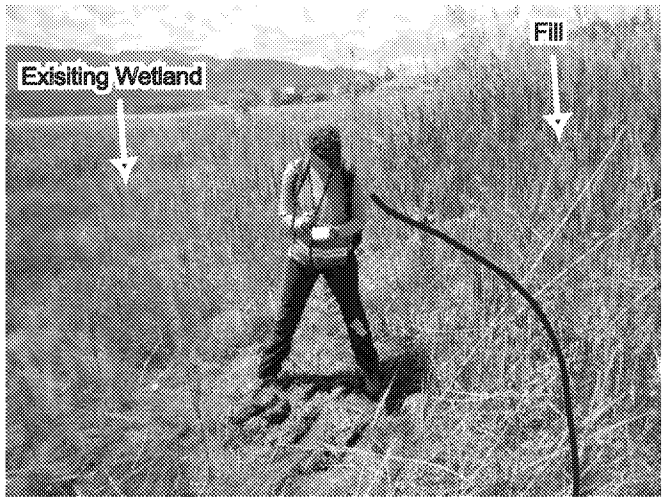


Photo 12b. West view of Fill boundary against exsiting wetland. Wetland is approximately 2-3 feet lower than top of fill removal area. Top of fill to be removed.

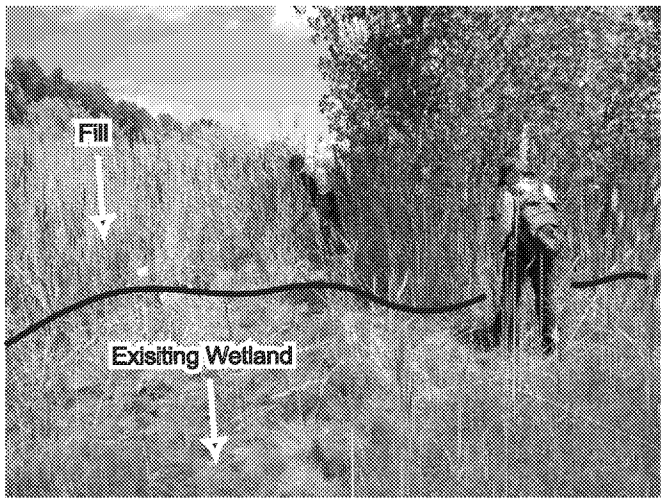


Photo 12c. North view of Fill boundary against exisiting wetland.

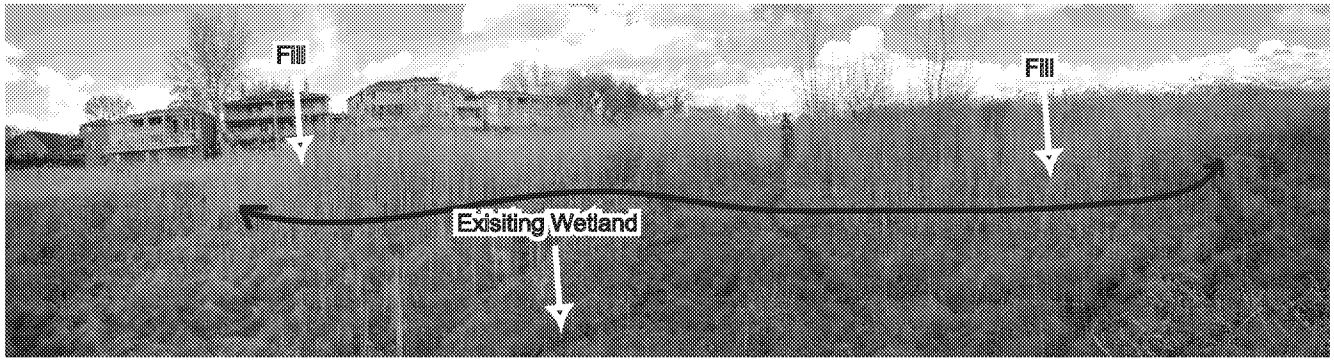


Photo 13. North west view of Fill boundary agianst existing wetland. (*Photo taken 4-17-18). Wetland is approximately 2-3 feet lower than top of fill removal area. Top of fill to be removed.

Photo 14. South west view of level station L2 on top of existing Harbor Dike.

Photo 15. North west view of Outlet Pipe that feeds the flowing stream.

Wetland sample point 1A (SP1A). Close-up of wetland soil profile.

Wetland sample point 1A (SP1A). South view of wetland vegetation plot.

Upland sample pont 1B (SP1B). Close-up of upland soil profile.

Upland Sample point 1B (SP1B). South view of upland vegetation plot.

Wetland sample point (SP2A). Close-up of wetland soil profile.

Wetland sample point (SP2A). North view of wetland vegetation plot.

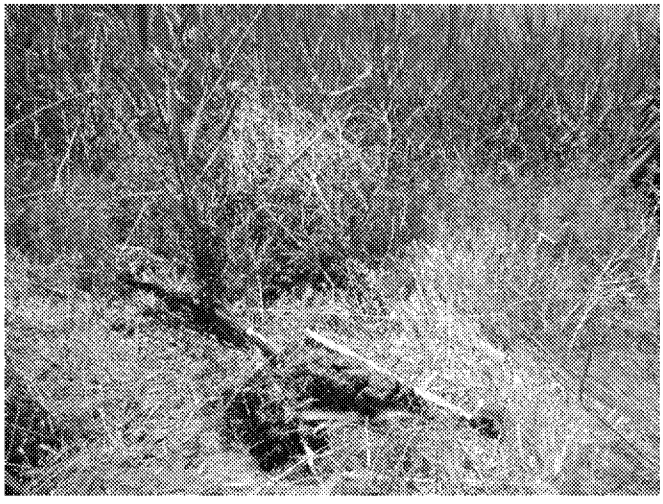
Upland sample point 2B (SP2B). Close-up of upland soil profile.

Upland sample point 2B (SP2B). South view of phragmites in upland vegetation plot.

Wetland sample point 3A(SP3A). Close-up of wetland soil profile.

Wetland sample point 3A(SP3A). West view of wetland vegetation plot.

Upland sample point 3B(SP3B). Close-up of upland soil profile.



Upland sample point 3B(SP3B). South view of upland vegetation plot.